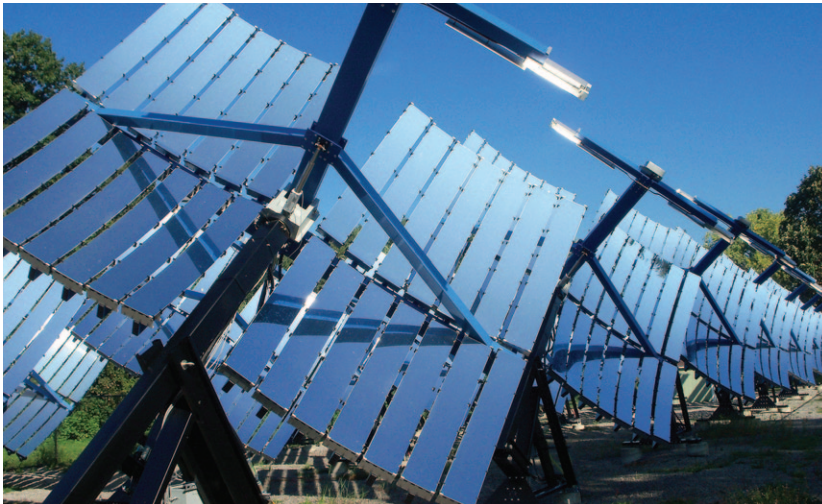


Low-Cost, Scalable Solar Energy Launches with NASA Support

Generating Power with High-Performance CPV Vertical Multi-Junction Silicon Solar Cells



The StarGen® solar concentrator's advanced tracking system enables each unit to capture sunlight throughout the day and focus it onto PhotoVolt™ solar cells.



Early collaboration with NASA's Glenn Research Center through Space Act agreements enabled GreenField Solar® to develop a unique low-cost, high-intensity vertical multi-junction silicon solar cell. The PhotoVolt solar cell differs from conventional one-sun silicon-based solar cells in that instead of lying flat, it is engineered to sit on its edge. This design allows the cells to operate efficiently under high concentration, and to operate with high voltage and low current. These novel features enabled the design of a high-performance concentrated photovoltaic (CPV) system that focuses light onto a densely packed array of PhotoVolt solar cells. The StarGen solar concentrator's system of mirrors, support structure, and sun-tracking equipment concentrates sunlight up to 900 times its normal intensity onto this dense array of PhotoVolt cells, resulting in a 1.5 kilowatt system. GreenField Solar credits much of its success to strategic partnering and support the company received early on from NASA Glenn.

Benefits of Collaboration

- GreenField Solar benefitted from access to Glenn's expertise and facilities, which were key to helping the company progress through the solar cell's early development.
- NASA gained the use of a novel photovoltaic (PV) cell, which has played a role in NASA missions.
- U.S. jobs were created as GreenField Solar developed the technology; job opportunities will increase as the company gears up for commercialization.
- Clean, renewable solar energy has zero greenhouse gas emissions and can generate grid-scale solar power at a lower cost per kilowatt-hour than most existing PV systems, achieving grid parity.

GreenField Solar and StarGen are registered trademarks of GreenField Solar. Registration of PhotoVolt is pending.

SEED CORPS

On the Record

“GreenField Solar’s founders were able to work closely with experts in the field at NASA’s Glenn Research Center, which contributed to the success of the company. This technology represents a successful partnership between NASA and the commercial sector, and we are showcasing it in our Cleveland facility.” —*Roshanak Hakimzadeh, Deputy Chief Technologist, NASA’s Glenn Research Center*

“The support we’ve received from NASA has been instrumental to our success, and the facilities and expertise at Glenn were essential to solving numerous technical issues. The credibility that NASA has brought to our development has helped in our fundraising.” —*Neil Sater, CEO and Founder, GreenField Solar*

About GreenField Solar

Based in Oberlin, Ohio, GreenField Solar develops high-intensity CPV systems using its patented solar cell technology. Co-founded by Bernard Sater, a retired Glenn scientist, the company seeks to make CPV power systems economically viable for use in large-scale solar installations and cost competitive with electricity generated from conventional fuel sources. The company is working to commercialize its technology and move its products into volume production.

Technology Details

A NASA-supported innovation, the PhotoVolt solar cell is a rugged, silicon-based, vertical multi-junction solar cell. The PhotoVolt solar cell differs from conventional one-sun silicon-based solar cells in that light enters the PhotoVolt cell on what would be a conventional cell’s edge. This architecture enables a tightly packed dense array of solar cells that under concentrated light operate at high voltages and low currents. GreenField Solar uses low-cost mirrors to focus light onto the dense array of solar cells in its StarGen solar concentrator, resulting in the use of a small fraction of the expensive semiconductor material utilized by conventional one-sun silicon modules. An advanced tracking and control system enables each 18-foot, free-standing CPV unit to capture sunlight throughout the day and focus it onto the uniquely designed PhotoVolt solar cells. In addition to electricity, the concentrator harvests thermal energy through its liquid cooling system. This combined heat and power or cogeneration CPV unit can be used for heating, cooling, and/or generating electricity.

GreenField Solar anticipates that the StarGen solar concentrator’s low installation costs and high energy production will produce solar electricity costs of less than 9 cents per kilowatt-hour in high sun environments within the next few years, achieving grid parity. Applications include small commercial or industrial systems for distributed energy generation as well as bulk electric power generation for grid-scale central power plants.

The Collaboration Process

Bernard Sater, the GreenField Solar founder and former Glenn scientist, retired early from NASA in 1994 to develop the solar cell. Under a series of Space Act agreements, he continued research in the lab at Glenn, collaborating with experts and developing and testing the solar cell. Because there were no calibrated high-intensity testing standards available then, engineers at Glenn helped develop evaluation procedures using a NASA large-area pulsed solar simulator. This is just one example of the many ways that Glenn’s world-class facilities and expert staff uniquely position the Center to demonstrate and verify cutting-edge technologies such as this solar cell.

In the late 1990s, the innovation successfully powered an instrument panel on the Demonstration of Autonomous Rendezvous Technology project. In 2008, Glenn purchased the first two StarGen solar concentrators and installed them at its Cleveland facility to provide supplemental power and heat for a facility and for extensive testing and evaluation. The company also benefitted early on from grants from the Department of Energy Inventions and Innovation Program. More recently, GreenField Solar was awarded an Ohio Third Frontier Photovoltaic Program award to support commercialization efforts.

Gearing Up for Commercialization

GreenField Solar is working to commercialize its StarGen solar concentrator. In addition to the units at Glenn, the company is gathering data from other Ohio demonstration projects, including the Rockefeller Park Greenhouse in Cleveland. U.S. job opportunities will increase as GreenField ramps up its commercialization efforts.

For More Information

For more information about this and other technology licensing opportunities, please contact:

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